

## Math Achievement Rubric for 7<sup>th</sup> Grade Knollwood Report Card

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<p>Number Concepts and Computation: Understands uses / representations of numbers</p>	<p>3</p> <ul style="list-style-type: none"><li>• Names the fractional part of a whole when the parts are varying sizes using a fraction, decimal, and percent</li><li>• Expresses remainders as fractions or decimals rounded to the designated place, depending upon the situation</li><li>• Lists the prime factorization of a number using exponents</li><li>• Uses factors, multiples, prime factorization, and relatively prime numbers to solve problems in an efficient manner</li><li>• Consistently understands and uses integers, ratios, and proportions to represent quantitative relationships</li><li>• Converts between fractions, decimals (including repeating decimals), and percents with automaticity</li><li>• Solves multi-step problems involving percents and explains strategies used</li><li>• Uses exponents to represent repeated multiplication</li><li>• Demonstrates facility with representing large and small numbers in exponential, scientific, and calculator notation</li><li>• Explains pi as the ratio of the circumference of a circle to its diameter</li></ul>
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	<p>2</p> <ul style="list-style-type: none"> <li>Names the fractional part when parts are different sizes using a fraction, decimal or percent with an example or teacher prompting</li> <li>Expresses remainders as a fraction or decimal</li> <li>Lists the prime factorization of a number</li> <li>Uses factors, multiples, prime factorization, and relatively prime numbers to solve problems, with partial success</li> <li>Understands and uses integers, ratios, and proportions to represent quantitative relationships</li> <li>Converts between fractions, decimals (including repeating decimals), and percents with partial success</li> <li>Solves single step and some multi-step problems involving percents using proportion or decimals</li> <li>Recognizes appropriate situations for the use of pi</li> </ul>
	<p>1</p> <ul style="list-style-type: none"> <li>Names the fractional part of a whole when the parts are uniform in size</li> <li>Attempts to use a factor tree to find the prime factorization of a number</li> <li>Uses ratios and proportion to represent quantitative relationships when given a model</li> <li>Renames common fractions (i.e. halves, thirds, fourths, fifths, tenths, twentieths, and hundredths) as decimals and percents</li> <li>Attempts to solve single-step problems involving percent using proportion</li> <li>Can substitute 3.14 for pi in a given formula</li> </ul>
	<p>E</p> <ul style="list-style-type: none"> <li>Understands the concept of negative exponents</li> <li>Converts between fractions, decimals (including repeating decimals) and percents easily to set up and solve complex word problems</li> </ul>

<p>Number Concepts and Computation: Computes accurately</p>	<p>3</p> <ul style="list-style-type: none"> <li>• Consistently selects appropriate methods and is fluent in their use for computing with fractions, decimals, integers and percents from among mental arithmetic, paper-and-pencil algorithms, calculators, and estimation, depending upon the situation and applies method to find the correct result</li> <li>• Uses order of operations correctly and appropriately to evaluate an expression</li> <li>• Sets up and solves proportions using either rate or cross-products methods and explains reasoning</li> <li>• Consistently computes with positive and negative exponents on whole number bases</li> <li>• Computes percent of increase/decrease</li> </ul>
	<p>2</p> <ul style="list-style-type: none"> <li>• Uses mental arithmetic, paper-and-pencil algorithms, and calculators to operate on whole numbers, fractions and decimals, and signed numbers with partial accuracy</li> <li>• Applies standard algorithms for computing with fractions, decimals, and integers</li> <li>• Understands that there is an order of operations</li> <li>• Solves proportions using cross-products or unit rate method, with partial accuracy</li> <li>• Computes with positive and negative exponents on whole number bases with partial success</li> <li>• Computes percent of increase/decrease with partial success</li> <li>• Fact knowledge may impede speed and accuracy</li> </ul>

	<p>1</p> <ul style="list-style-type: none"> <li>• Attempts to use strategies to operate on whole numbers, fractions, decimals, and signed numbers</li> <li>• Operates from left to right</li> <li>• Solves given proportions using cross products with partial accuracy</li> <li>• Computes percent of increase/decrease with model or teacher prompting</li> <li>• Fact knowledge often impedes speed and accuracy</li> </ul>
	<p>E</p> <ul style="list-style-type: none"> <li>• Performs calculations on all rational numbers and can explain the underlying principles, including square root</li> <li>• Explains order of operations used in solving complex word problems</li> <li>• Solves complex percent problems</li> <li>• Computes with a strong intuitive number sense</li> </ul>
<p>Geometry, Measurement and Data: Understands and applies geometric concepts</p>	<p>3</p> <ul style="list-style-type: none"> <li>• Analyzes characteristics and properties of two- and three-dimensional geometric shapes</li> <li>• Develops mathematical arguments about geometric relationships</li> <li>• Applies congruence and similarity to analyze mathematical situations</li> <li>• Understands relationships among the angles, side lengths, perimeters, and areas of similar objects</li> <li>• Develops and critiques inductive and deductive arguments concerning geometric ideas and objects</li> <li>• Solves problems involving similarity and scale factors, using proportional reasoning</li> <li>• Identifies, describes, and sketches (including plotting on the coordinate plane) instances of reflections, translations, and rotations</li> <li>• Consistently uses ordered pairs of numbers to name, locate, and plot points in all four quadrants of a coordinate plane and on the x and y axes</li> <li>• Consistently identifies the x and y axes</li> </ul>

	<p>2</p> <ul style="list-style-type: none"> <li>• Understands such attributes as length, area, weight, volume, and angle size and selects the appropriate type of unit for measuring each attribute</li> <li>• Understands the concepts of area, length, and volume</li> <li>• Uses strategies for estimating or calculating the perimeters and areas of irregular shapes</li> <li>• Describes, classifies and understands relationships among types of two- and three- dimensional objects, using their defining properties</li> <li>• Identifies, describes and sketches examples of reflections, translations, and rotations using tracing paper</li> <li>• Uses ordered pairs of numbers to name, locate, and plot points in all four quadrants of a coordinate plane and on x and y axes with prompting</li> </ul>
	<p>1</p> <ul style="list-style-type: none"> <li>• Understands attributes such as length, area, and weight and can select the appropriate type of unit for measuring these attributes</li> <li>• Uses a given method to find the area of a rectangle</li> <li>• Finds the perimeter of irregular shapes</li> <li>• Identifies, describes, and sketches examples of translations</li> <li>• Uses ordered pairs of numbers to name, locate, and plot points in the first quadrant</li> </ul>

	<p>E</p> <ul style="list-style-type: none"> <li>• Describe sizes, positions, and orientations of shapes under informal transformations such as flips, turns, slides, and scaling.</li> <li>• Develops strategies to determine the surface area and volume of selected prisms, pyramids, and cylinders</li> <li>• Understands relationships among the angles, side lengths, perimeter, areas, and volumes of similar objects</li> <li>• Creates and critiques inductive and deductive arguments concerning geometric ideas and relationships, such as congruence, similarity, and the Pythagorean relationship</li> <li>• Describes rules for the way coordinates of the vertices will change or not change after flip, turn, or slide</li> </ul>
<p>Geometry, Measurement and Data: Analyzes / interprets / graphically represents data</p>	<p>3</p> <ul style="list-style-type: none"> <li>• Consistently collects and organizes data or uses given data to accurately graph data in a table, histogram, stem-and-leaf plot, box plot, and scatter plot, with reasonable titles, intervals, labels and keys</li> <li>• Chooses and creates appropriate type of graph to represent a situation</li> <li>• Creates graph on the graphing calculator with printed instructions</li> <li>• Finds and uses the minimum, maximum, mode, mean, median, range, and inter-quartile range and graphs to ask and answer questions, draw conclusions, and make predictions</li> <li>• Recognizes the effect of outliers on median and mean</li> <li>• Can create data set when given some statistical landmarks</li> <li>• Make conjectures about the relationship shown in a scatter plot</li> </ul>

	<p>2</p> <ul style="list-style-type: none"> <li>• Can collect and organize data or use given data to create a table, histogram, stem-and-leaf plot, box plot, or scatter plot with reasonable titles, intervals, labels, and keys</li> <li>• Collects data but the graph may not give us a clear picture of it</li> <li>• Creates graph on the graphing calculator with teacher support</li> <li>• Finds and uses the minimum, maximum, mode, mean, median, range, and inter-quartile range and graphs to ask and answer questions</li> <li>• Can visually recognize outliers in a set of data or graph</li> <li>• Attempts to create data set when given some statistical landmarks</li> </ul>
	<p>1</p> <ul style="list-style-type: none"> <li>• Uses given data to create table, histogram, stem-and-leaf plot, box plot, and scatter plot</li> <li>• Recognizes appropriate type of graph to represent a situation</li> <li>• Finds and uses the minimum, maximum, mode, mean, median, and range to answer questions</li> </ul>
	<p>E</p> <ul style="list-style-type: none"> <li>• Creates graph on the graphing calculator independently</li> <li>• Recognizes and explains in detail how an outlier will affect a data set</li> </ul>
<p>Geometry, Measurement and Data: Uses appropriate strategies / formulas to measure</p>	<p>3</p> <ul style="list-style-type: none"> <li>• If given an irregular shape, can find the length of a side, including curved sides, when given enough information</li> <li>• Correctly applies formula to find perimeter of irregular figures</li> <li>• Correctly applies formulas to find area of 2-dimensional shapes, including shapes that are combinations of simple shapes (circle, triangle, rectangle, parallelogram, trapezoid) and explains strategy</li> <li>• Correctly applies formulas to find surface area and volume of 3-dimensional figures, including figures that are combinations of simple figures (prisms, pyramids, cylinders, cones) and explains strategy</li> <li>• Easily comprehends 2-dimensional drawings of 3-dimensional figures</li> </ul>

	<ul style="list-style-type: none"> <li>• Works backward to find a dimension of a shape given its perimeter, circumference, area or volume</li> <li>• Finds dimensions of similar figure given a scale factor (enlargement or reduction)</li> <li>• Calculates the scale factor used to enlarge/reduce a polygon</li> </ul>
	<p style="text-align: center;">2</p> <ul style="list-style-type: none"> <li>• If given an irregular shape, can find the length of straight sides when given enough information</li> <li>• Describes and uses strategies to find the perimeter of polygons</li> <li>• Applies formulas to find area of 2-dimensional shapes, including shapes that are combinations of simple shapes (circle, triangle, rectangle, parallelogram, trapezoid) with partial success</li> <li>• Applies formulas to find surface area and volume of 3-dimensional figures, including figures that are combinations of simple figures with partial success (prisms, pyramids, cylinders, cones)</li> <li>• Comprehends 2-dimensional drawings of 3-dimensional figures when given a model or teacher prompting</li> <li>• Works backward to find a missing dimension of a shape given its perimeter, circumference, or area (triangles and rectangles)</li> <li>• Calculates missing sides on similar figures when given a scale factor</li> </ul>
	<p style="text-align: center;">1</p> <ul style="list-style-type: none"> <li>• If given an irregular shape, can find the length of straight sides when given enough information with partial success</li> <li>• Uses strategies to find the area of circle, triangle, rectangle, parallelogram, and trapezoid</li> <li>• Uses strategies to find the surface area and volume of rectangular prisms</li> <li>• Using a formula, calculates the volume of a rectangular prism</li> <li>• Works backward to find a missing dimension of a shape given its perimeter</li> <li>• Calculates missing sides on similar figures using a proportion</li> <li>• Enlarges/reduces a polygon given a whole number scale factor</li> </ul>



	<p>E</p> <ul style="list-style-type: none"> <li>• Solves multi-step problems involving perimeter, area, and volume with other mathematical concepts (ex: Given the dimensions of a cereal box, find dimensions of new box that will have a volume that is 50% larger than the original.)</li> <li>• Uses the Pythagorean theorem to find the missing side of a right triangle</li> <li>• Solves for perimeter and area or missing dimension using variable expressions</li> </ul>
Patterns and Algebra: Understands / represents relations and functions	<p>3</p> <ul style="list-style-type: none"> <li>• Represents relationships using words, algebraic notation, tables and graphs</li> <li>• Translates from one representation to another and uses representations to solve problems</li> <li>• Uses several properties of linear functions to explain a graph of the function</li> <li>• Describes differences between graphs of relations in order to explain the relations</li> <li>• Uses knowledge of intercepts to identify graphs</li> </ul>
	<p>2</p> <ul style="list-style-type: none"> <li>• Writes rules for relationships involving the four basic arithmetic operations</li> <li>• Represents simple relationships using words, symbols, tables and graphs and uses those representations to solve problems</li> <li>• Chooses appropriate representations for relations but struggles with the language to explain to make generalizations about them</li> </ul>
	<p>1</p> <ul style="list-style-type: none"> <li>• Uses words and symbols to describe and write rules for relationships that involve one of the basic arithmetic operations</li> <li>• Interprets graphs by using points but not in a global sense</li> <li>• Neglects connecting the representation back to the original problem context</li> </ul>

	<p>E</p> <ul style="list-style-type: none"> <li>• Moves from a specific solution to make generalizations about types of solutions</li> <li>• Makes connections between different algebraic representations: graphs, equations, verbal rules, and tables</li> <li>• Understands how an equation determines the shape of the graph</li> </ul>
Patterns and Algebra: Recognizes, describes, extends, creates patterns	<p>3</p> <ul style="list-style-type: none"> <li>• Describes rules for patterns and uses them to solve patterns</li> <li>• Represents patterns and rules using algebraic notation</li> <li>• Draws and extends a visual pattern</li> <li>• Uses a table to extend a pattern</li> <li>• Expresses an even or odd number algebraically</li> <li>• Notices relationships and number patterns, such as perfect squares</li> <li>• Writes an expression to give the <math>n</math>th term in a sequence</li> </ul>
	<p>2</p> <ul style="list-style-type: none"> <li>• Uses a given rule for patterns and uses them to solve problems</li> <li>• Recognizes squares and square numbers</li> <li>• Draws the next step in a visual pattern</li> </ul>
	<p>1</p> <ul style="list-style-type: none"> <li>• Recognizes vertical patterns in tables</li> <li>• Sees differences from one stage in a visual pattern to the next but may not be able to create the next stage</li> </ul>
	<p>E</p> <ul style="list-style-type: none"> <li>• Able to work backwards to find inputs given outputs with complicated patterns</li> <li>• Describes rules for patterns involving exponents and uses them to solve patterns</li> <li>• Is able to “do and undo” a computational procedure by working backwards</li> <li>• Writes an equation or makes a generalized rule for a pattern</li> <li>• Considers all the relationships in a pattern</li> </ul>

Patterns and Algebra: Operates on expressions, equations, inequalities	<p>3</p> <ul style="list-style-type: none"> <li>• Demonstrates understanding of the use of variables</li> <li>• Describes and applies the distributive property and combines like terms in solving equations</li> <li>• Solves equations and inequalities with variable and number terms on both sides of the equal sign</li> <li>• Graphs solution sets to inequalities</li> </ul>
	<p>2</p> <ul style="list-style-type: none"> <li>• Given the value of variables, correctly evaluates an expression containing those variables</li> <li>• Applies the distributive property and combines like terms in solving equations with partial success</li> <li>• Solves equations with variable and number terms on both sides of the equal sign</li> </ul>
	<p>1</p> <ul style="list-style-type: none"> <li>• Given the value of a variable, correctly evaluates an expression</li> <li>• Combines like terms in solving an equation</li> <li>• Solves simple two-step equations</li> </ul>
	<p>E</p> <ul style="list-style-type: none"> <li>• Operates on binomials</li> <li>• Solves systems of equations</li> </ul>
Patterns and Algebra: Uses algebraic notation to represent and analyze	<p>3</p> <ul style="list-style-type: none"> <li>• Given a word problem, represents the situation in algebraic notation, creates a table of data and graphs it</li> <li>• Consistently identifies the slope and intercept of a line and explains the significance of each in the relationship, the equation, and the graph</li> </ul>
	<p>2</p> <ul style="list-style-type: none"> <li>• Given a word problem, represents the situation in a table and graph</li> <li>• Identifies the slope and intercept of a line and attempts to explain the significance of each in the relationship, the equation, and the graph</li> </ul>

	<p>1</p> <ul style="list-style-type: none"> <li>Given a word problem, represents the situation in a table or graph</li> <li>Attempts to identify the slope and intercept of a line</li> </ul>
	<p>E</p> <ul style="list-style-type: none"> <li>Analyzes and interprets patterns and algebraic situations to make predictions and inferences</li> <li>Uses point-slope and slope-intercept form of an equation and can interchange between the two</li> </ul>
Open-Ended Response: Communicates mathematical reasoning	<p>3</p> <ul style="list-style-type: none"> <li>Analyzes problems, identifies components, and then formulates plan for solving</li> <li>Extends, modifies, or reformulates methods as solution unfolds</li> <li>Can support numeric solutions with graphical representations</li> <li>Uses graphical representations and/or physical objects to solve problems or illustrate solutions</li> <li>Explains solutions to problems using sentences/paragraphs in speaking or writing</li> <li>Makes overt connections with graphical or pictorial representations</li> <li>Uses mathematical terminology appropriate to the situation</li> </ul>
	<p>2</p> <ul style="list-style-type: none"> <li>Uses prescribed processes to solve problems</li> <li>Can use alternate processes to solve problems following demonstration of such</li> <li>Graphical representations accompany solutions when required</li> <li>Describes process of solving problems with simple sentences or bulleted phrases</li> <li>Sketches of physical objects, simple graphic organizers, or graphs to represent the situation sometimes accompany written responses</li> <li>Mathematical terminology included in the problem can be included in explanation of solution</li> </ul>

	<p>1</p> <ul style="list-style-type: none"> <li>• Uses parts of given processes to begin to solve problems</li> <li>• Names parts of the solution</li> <li>• Tells about problem using some mathematical terms given in the problem</li> <li>• Sketches or graphs are sometimes presented with the solution but are not always clearly linked</li> </ul>
	<p>E</p> <ul style="list-style-type: none"> <li>• Designs methods of solving problems based on analysis and application of given theories and knowledge in new situations</li> <li>• Provides counter examples in order to prove solutions</li> <li>• Chooses to use graphical representations and/or physical objects in unorthodox ways to solve problems or illustrate solutions</li> <li>• Convinces others that solutions to problems are plausible and supports his/her thinking by speaking or writing in paragraphs and makes clear and overt connections with graphical or pictorial representations</li> <li>• Communications always contain appropriate and sophisticated mathematical language and notations</li> </ul>